CLAIMS

1. A method comprising:

generating an edge map from scanned image data; and

analyzing the edge map to determine a plurality of boundaries; and

evaluating the boundaries based on a set of rules to identify a plurality of objects.

2. A method as recited in claim 1, wherein the analyzing further comprises taking a Hough transform of the scanned image to determine the boundaries.

3. A method as recited in claim 1, wherein a first object of the objects is aligned with respect to another object of the objects.

4. A method as recited in claim 1, wherein at least one subset of the objects are rectangular in shape.

5. A method as recited in claim 1, wherein at least one subset of the plurality of objects are photographs.

6. A computer readable medium comprising computer-executable instructions to perform a method as recited in claim 1.

7. A method for detecting one or more objects in image data, the method comprising:

generating an edge map from the image data; and

analyzing the edge map to determine a plurality of boundaries of the one or more objects.

8. A method as recited in claim 7, wherein the one or more objects are photographs.

9. A method as recited in claim 7, wherein the one or more objects are rectangular in shape.

10. A method as recited in claim 7, further comprising segmenting the one or more objects based on the set of boundaries.

11. A method as recited in claim 7, wherein the edge map comprises an array of elements, each element representing a respective pixel of the image data; and

wherein the generating further comprises:

estimating a background color of a scanner lid;

for each pixel of at least one subset of the image data:

identifying an absolute difference between a value of a current pixel and the background color; and

if the absolute difference is greater than a predetermined threshold, indicating that a corresponding array element represents a pixel of the at least one subset of image data that belongs to an edge.

12. A method as recited in claim 7:

wherein the edge map comprises an array of elements, each element representing a respective pixel of the image data;

wherein the analyzing further comprises:

transforming the array of elements to produce a set of domain peaks, each domain peak corresponding to a straight line of a set of straight lines; and

determining which of the straight lines belong to the set of boundaries based on a set of rules.

13. A method as recited in claim 12, wherein the determining further comprises:

identifying a boundary set that indicates an object at a distinct angle as compared to an orientation of a previously found object;

identifying a boundary set that indicates an object having a same dimension as a previously found object; and

identifying pairs of parallel and perpendicular boundaries that indicate an object that satisfies a substantially non-background interior condition with a previously found object.

14. A method as recited in claim 12:

wherein the edge map comprises an array of elements, each element representing a respective pixel of the image data; and

wherein the transforming further comprises taking a Hough transform of the array of elements to produce the set of domain peaks.

15. A method as recited in claim 7:

wherein the edge map comprises an array of elements, each element representing a respective pixel of the image data;

wherein the analyzing further comprises:

transforming the array elements to produce a set of domain peaks, each domain peak corresponding to a straight line of a set of straight lines; and

determining which of the straight lines belong to the set of boundaries based on a set of rules, the set of rules comprising rules that are directed to:

identifying a first object with a first dimension; and

seeking a same sized object with a second dimension that corresponds to the first dimension

16. A method as recited by claim 15, wherein the identifying comprises:

determining a background color;

determining a candidate object; and

if an interior portion of the candidate object is not consistent with the background color, concluding that the candidate object is the first object.

17. A method as recited in claim 15, wherein a line of the straight lines corresponds to a candidate object, the seeking further comprising:

detecting a first image to background transition that corresponds to the first image, and a second image to background transition that corresponds to the line; and

if the first image to background transition does not coincide with the second image to background transition, assigning the line to be a boundary of a different object.

18. A computer readable medium comprising a computer program configured to perform a method as recited in claim 1.

19. A method for detecting whether image data represents more than one object, the method comprising:

determining a background color of a scanner lid;

identifying a set of transitions between the background color and other colors that correspond to the image data; and

analyzing the set of transitions to detect a set of image data characteristics;

estimating based on a set of one or more rules, a number of objects based on the set of image data characteristics.

20. A method as recited in claim 19, wherein the objects are rectangular in shape.

21. A method as recited in claim 19, wherein the image data is scanned preview image data.

22. A method as recited in claim 19, wherein the analyzing further comprises taking a Hough transform of the set of transitions to detect the set of image data characteristics.

23. A method as recited in claim 19, further comprising:

calculating a set of boundaries that delineate the objects based on the set of image data characteristics; and

segmenting the objects from the image data based on the set of boundaries.

24. A method as recited in claim 19, wherein the identifying further comprises:

for each row(i) of image data:

calculating a left(i) transition from background data to image data;

calculating a right(i) transition from image data to background data;

determining a difference(i) between right(i) transition and left(i) transition;

for each column(j) of image data:

calculating a top(j) transition from background data to image data;

calculating a bottom(j) transition from image data to background data;

determine a difference(j) between bottom(j) transition and top(j) transition;

generating a first histogram from each difference(i);

generating a second histogram from each difference(j); and

using a set of characteristics that are displayed by the first and second histograms display to determine whether the image data represents one objects or more than one object.

25. A method as recited in claim 19, further comprising:

generating a first histogram representing horizontal transitions from the transitions;

generating a second histogram representing vertical transitions from the transitions;

the first and second histograms displaying a set of peaks that identify whether the image data comprises more than one object; and

the set of rules comprising the following rules:

(a) if the set of peaks comprises only a single peak, classifying the image data as containing only a single object;

(b) if the set of peaks comprises only two peaks, classifying the image data as containing multiple objects;

(c) classifying the image data as comprising multiple objects if there is a gap in either the first histogram or the second histogram; and

(d) if neither (a), (b), or (c) apply, classifying the image data as comprising multiple objects.

26. One or more computer-readable media containing a computer executable program that performs a method as recited in claim 19.

27. A device for detecting multiple objects in image data, the device comprising:

a processor configured to execute computer program instructions for:

generating an edge map from the image data;

analyzing the edge map to determine a set of boundaries of the one or more objects; and

segmenting the one or more objects based on the set of boundaries.

28. A device as recited in claim 27, wherein the analyzing further comprises taking a Hough transform of the edge map to determine the set of boundaries.

29. A device as recited in claim 27, wherein the analyzing further comprises:

determining a set of transitions between the set of boundaries and a background color;

identifying a set of characteristics from the set of transitions, the set of characteristics being used to indicate whether the image data comprises a single object or whether the image data comprises a plurality of objects; and

if the image data corresponds to a plurality of objects, assigning particular ones of the set of boundaries to particular ones of the plurality of objects based on a set of rules.

30. A device as recited in claim 29, wherein the set of rules comprises rules that are directed to:

determining a background color of a scanner lid;

determining a candidate object;

determining that the candidate object is a first object, the first object having a first dimension if an interior portion of the candidate object is not consistent with the background color; and

seeking a same sized object with a second dimension that corresponds to the first dimension.

31. A device as recited in claim 29, wherein the set of rules comprises rules that are directed to:

determining a background color of a scanner lid;

determining a first candidate object;

if an interior portion of the first candidate object is not consistent with the background color, determining that the first candidate object is a first object, the first object having a first dimension; and

seeking a same sized object with a second dimension that corresponds to the first dimension, the seeking comprising:

identifying a boundary of the set of boundaries that corresponds to a second candidate object;

detecting a first image to background transition that corresponds to the first object, and a second image to background transition that corresponds to the boundary; and

if the first image to background transition does not coincide with the second image to background transition, assigning the boundary to the same sized object.

32. A device as recited in claim 29, wherein the identifying further comprises:

for each row(i) of image data:

calculating a left(i) transition from background data to image data;

calculating a right(i) transition from image data to background data;

determine a difference(i) between right(i) transition and left(i) transition;

for each column(j) of image data:

calculating a top(j) transition from background data to image data;

calculating a bottom(j) transition from image data to background data;

determine a difference(j) between bottom(j) transition and top(i) transition;

generating a first histogram from each difference(i);

generating a second histogram from each difference(j); and

wherein the first and second histograms display the set of characteristics.

33. A device as recited in claim 29, wherein the set of rules is a first set of rules, and wherein the set of characteristics indicate a set of peaks that are used to identify whether the image data comprises a single object or a plurality of objects based on a second set of rules, the second set of rules comprising rules that are directed to:

(a) if the set of peaks comprises only a single peak, classifying the image data as containing only a single object;

(b) if the set of peaks comprises only two peaks, classifying the image data as containing a plurality of objects;

(c) if there is a gap in either the first histogram or the second histogram, then classifying the image data as comprising containing a plurality of objects; and

(d) if neither (a), (b), or (c) apply, classifying the image data as comprising containing a plurality of objects.

34. A computer readable storage medium comprising a program module for detecting multiple objects in image data, wherein the program module performs acts comprising:

generating an edge map from the image data; and

analyzing the edge map to determine a set of boundaries of the one or more objects.

35. A computer readable storage medium as recited in claim 34, wherein the one or more objects are photographs.

36. A computer readable storage medium as recited in claim 34, wherein the one or more objects are rectangular in shape.

37. A computer readable storage medium as recited in claim 34, wherein the program module further performs acts comprising segmenting the one or more objects based on the set of boundaries.

38. A computer readable storage medium as recited in claim 34, wherein the edge map comprises an array of elements, each element representing a respective pixel of the image data; and

wherein the generating further comprises:

estimating a background color of a scanner lid;

for each pixel of the image data:

identifying an absolute difference between a value of the pixel and the background color; and

if the absolute difference is greater than a predetermined threshold, indicating that a corresponding array element represents a pixel of the image data that belongs to an edge.

39. A computer readable storage medium as recited in claim 34, wherein the analyzing further comprises:

transforming the array elements to produce a set of domain peaks, each domain peak corresponding to a straight line of a set of straight lines; and

determining which of the straight lines belong to the set of boundaries based on a set of rules.

40. A computer readable storage medium as recited in claim 39, wherein the transforming further comprises taking a Hough transform of the array of elements to produce the set of domain peaks.

41. A computer readable storage medium as recited in claim 34, wherein the analyzing further comprises:

transforming the array elements to produce a set of domain peaks, each domain peak corresponding to a straight line of a set of straight lines; and

determining which of the straight lines belong to the set of boundaries based on a set of rules, the set of rules comprising rules that are directed to:

identifying a first object with a first dimension; and

seeking a same sized object with a second dimension that corresponds to the first dimension.

42. A computer readable storage medium as recited in claim 41, wherein the identifying comprises:

determining a background color of a scanner lid;

determining a candidate object; and

if an interior portion of the candidate object is not consistent with the background color, concluding that the candidate object is the first object.

43. A computer readable storage medium as recited in claim 41, wherein a line of the straight lines corresponds to a candidate object, the seeking further comprising:

detecting a first image to background transition that corresponds to the first image, and a second image to background transition that corresponds to the line; and

if the first image to background transition does not coincide with the second image to background transition, assigning the line to be a boundary of a different object.

44. A computer comprising one or more computer-readable media as recited in claim 34.